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SOME ISSUES IN THE TEACHING OF HANDWRITING. II

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III

The previous article closed with a discussion of the application of the general issue between the analytic and the synthetic methods to the relation of form and movement.

A question which is closely related to the one which has just been discussed concerns the advisability of training all of the elements of the writing movement simultaneously, or training first one and then the other. The same answer may probably be given here as in the question of the relation of form and movement. The writing movement is so complex that it is doubtless better (unless indeed we attempt to confine it to one component) to lay emphasis first upon one of the components and then upon the other. The question then remains whether it is better to train first the finger component or the arm component. This question has already been touched upon. It may be added to what has already been said that although the child may use the finger movements predominantly in his early writing at the desk, the arm movements may be advantageously employed in writing at the board or even in writing with wax crayon or pencil upon paper. That is, when the child is using materials which call for large rough movements he may readily employ the arm movements. But when he is attempting to write letters in smaller compass and to produce letters correct in form it is probably well to allow him at first to follow his natural inclination to use the finger movement.

The use of the arm component in conjunction with the finger movements may then be deferred until the child has developed greater motor skill and control.

IV

The third application of the alternative between the analytic and the synthetic methods is found in the development of the letter forms. That is, the procedure may be to begin with words or groups of letters and lead the child to perfect the individual details of form by a subsequent analysis. This procedure has the advantage of eliciting the interest of the child from the beginning, and of training not merely the separate letters, but also at the same time the connections between them. The advantages then of this method are based upon the considerations of interest and economy.

The synthetic method, on the other hand, begins with the individual letters or even the so-called "elements of the letters." The extreme form of this method is now very seldom used, but was quite common two or three decades ago, and we still find traces of it. The extreme synthetic method is fallacious in supposing that the elements into which the letters are analyzed are the psychological elements of the letters. It therefore puts an unnecessary burden upon the mind of the child by calling to his attention these artificial parts of the letters. The letter is a psychological unit and defects in its form may be remedied by calling attention to them without the burden of the procedure of developing a series of elements. The question, then, is concerned with the alternative between the use of letters or of words at the beginning of the writing drill. The use of the letters—that is, the synthetic method—has the advantage of thoroughness in the training of the perception of form. It is a question, however, whether it is necessary to use the one or the other of these two methods exclusively. If words are used as the main basis of writing, then this procedure may be supplemented by the introduction of drill upon the letters whenever this seems to be necessary to remedy defects which may be found, or systematic drill upon the letters may be used to supplement the writing of words.

V

The final question in the teaching of writing to be discussed concerns the best form of movement to be employed. Several different forms of movement are distinguished in ordinary practice. These may be designated as the free-arm movement, the arm movement with rest, the finger movement, and the combined movement. The free-arm movement is made by swinging the arm freely from the shoulder. The arm movement with rest is the same as the free arm movement, except that the forearm rests upon the desk. This is often called the muscular movement, because the arm moves upon the muscle pad in the forearm as a sort of pivot. This term, however, is clearly a misnomer, since all movements are muscular, and the term "arm movement with rest" is a much better one.

The arm movement and the arm movement with rest are made without the co-operation of the fingers in the formation of the letters. In the finger movement, on the other hand, the fingers form the letters without the co-operation of the movement of the arm. The arm is only used so far as is necessary to carry the hand across the page. In the combined movement the arm carries the hand freely across the page, and co-operates to a certain extent in the individual strokes of the letters, but the fingers produce for the most part the details of the letters.

There is a third movement which is not included in the catalogue given above, but which may co-operate to a considerable extent in carrying the hand from one letter to another, and even in making the longer strokes of the letters. This movement is the rotation about the wrist joint.

The question now is, whether it is better to seek to develop one or the other of the extreme types of movement, or the combined movement. Extreme finger movement may be left out of account, since its disadvantages are manifest. The issue is between the exclusive use of the arm movement and a use of the combined arm, finger, and wrist movement.

The discovery of the advantages of the arm movement by teachers of commercial penmanship has led to its very general

adoption. It is a question, however, whether there are not disadvantages in this type of movement which minimize its advantages when it is used to the exclusion of the finger movement. The extreme emphasis on arm movement may be natural as a reaction against exclusive finger movement, but the whole question may now be thrown open for psychological analysis and for impartial investigation.

The arguments for the arm movement may be reviewed briefly. In the first place, arm movement is held to be superior because it involves so-called fundamental movements in distinction to the finger movements which are described as accessory. The meaning of fundamental and accessory movements in current use is not always clear. Several different meanings may, however, be distinguished. A fundamental movement is sometimes described as one which involves the larger muscles. If this is the basis of the distinction, it is clear that fundamental movements are by no means exclusively characteristic of the earlier period of the child's development, and cannot therefore be held to be more natural because of priority. The infant possesses very early many movements which involve small muscles. Among these are, for example, movements of the eyes, movements used in facial expression, the movements of the lips, tongue, and throat in sucking and swallowing, and the movements of the hand in grasping. These all develop before there is control over the large muscles of the trunk and legs in sitting, standing, or walking.

The second distinction which is sometimes made is that between central and peripheral movements. Central movements are those of the trunk or near the trunk, and peripheral movements those toward the extremity of the limbs. Thus finger movements would be peripheral. It is by no means certain, however, that the child shows a decided preference for central as distinguished from peripheral movements. The grasping reflex often appears during the first few days of life. Movements of the toes and feet are also very common in early infancy, and the abundant movements of the face may be regarded as peripheral in comparison with body movements.

These are the more common interpretations of fundamental and

accessory movement. A third distinction is more important. This distinction relates to the degree to which a movement is developed as an instinct early in the evolution of the race. Thus grasping is a fundamental movement, while writing is an accessory movement. As a consequence of this principle, the more a habit which is to be acquired has in common with instinctive movements, the more easily it may be learned. This distinction, however, does not affect the issue between finger and arm movements since writing by either form of movement is not instinctive.

The ease or difficulty with which a new movement is learned, then, is not determined to a great extent by the degree to which it is fundamental or accessory in the above senses of the terms. The conditions which do render a new movement difficult are, in general, the degree of its complexity and the degree of delicacy of adjustment which it demands. A movement which involves the co-ordination of a large number of different elementary movements is very much more difficult to learn than one which involves fewer elementary movements. Again, the movement which must be made within very narrowly defined limits is more difficult than a large coarse movement. From this point of view the arm movement possesses both an advantage and a disadvantage, in comparison with the finger movement. The arm movement clearly is less complex than the combined arm and finger movement, and so far forth is easier. On the other hand, the fingers are capable of a more delicate adjustment than the arm, and in this respect they have the advantage. We must therefore appeal to other considerations in order to arrive at a solution of the question.

Another reason which is offered why the arm movement should be preferred to the finger movement is that it is less fatiguing. There are no tests by which this question has been investigated, but general experience would seem to bear out the contention. It is found, for example, that writer's cramp may be prevented or to a certain extent relieved by an emphasis on the freer arm movements. It should be pointed out, however, that this consideration is not entirely conclusive. The use of the arm movement may render the total movement less fatiguing partly because it renders the writing freer and more open, and partly because it distributes the

work by dividing it between the fingers and the arm. Another reason that this procedure relieves cramping is that the larger muscles are not so easily set in motion by the nervous impulse as the smaller muscles. It is observed, for example, that in some forms of general nervous excitation it is the smaller muscles which are first affected. There seems then to be a tendency to over-emphasize the use of the smaller muscles, and it is therefore worth while to counteract this tendency by consciously emphasizing the use of the larger muscles. The evidence then indicates that the arm movement should be employed, but not necessarily to the exclusion of the finger movements.

A further reason which is advanced for the use of the arm movements is that they are more rapid than the finger movements. The fact which is here appealed to is doubtful. Experiments which have been made to determine the relative speed of movement of different joints of the arm and hand have shown that one can tap with the finger the most rapidly, and with the wrist, elbow, and shoulder successively less rapidly in the order named. The comparison of a rapid succession of up and down strokes made with the finger movement and with the arm movement also shows that the finger movement is slightly more rapid than the arm movement.

The arguments which may be advanced then in favor of the exclusive use of arm movement are not conclusive. They do indicate that the arm movement is a necessary element in the best form of writing movement.

There are further some considerations against the exclusive use of the arm movement. It is a fact which may readily be confirmed by observation that even when the exclusive arm movement is taught in the school, the pupils revert to a combined movement. That is, the teaching is not successful in training the exclusive use of the arm movement. This would seem to indicate on the face of it that it is natural to use the fingers to perform part of the work of writing.

This inference from general practice is confirmed by experiments upon the relative accuracy or delicacy of control of the fingers and of the arm. It has been found that the fingers are capable of a much more exact and delicate adjustment than the arm. It has

also been found that when it is necessary to make a delicate adjustment there is a tendency to emphasize the use of the fingers in contrast to the arm. This would indicate that the fingers are well adapted to perform the parts in the production of the letters which require the more delicate adjustment.

A further general consideration is that the movement of the arm requires the expenditure of much greater energy than the movement of the fingers, on account of the larger mass which must be set in motion. There is consequently more inertia to be overcome when the whole arm is used to make the details of the letters.

It would seem from a psychological analysis of the writing movement, then, that the most favorable type of movement is one which combines the use of the arm, of the wrist, and of the fingers, in such a way that each does the work for which it is best adapted. The arm is clearly adapted to carry the hand along the line. Rotation about the wrist may readily carry the fingers along during the course of the formation of a group of letters or of a word. The fingers may co-operate by producing the details of the letters. In general the best condition for an efficient movement is one in which the various joints are not held in a rigid position, but in which there is such flexibility that there may be smooth and harmonious co-operation between them. The suppression of one component movement on the part of the hand which is naturally flexible requires a condition of continual muscular tension and this interferes with ease and rapidity of the whole movement. The condition which is most favorable, then, to a rapid and easy movement is one of general flexibility and of harmonious co-operation of the different joints.

Such then are some of the issues which confront the teacher of writing, and such are at least some of the psychological principles which must be taken account of in their solution. Whether the solutions are correct or not may be decided by the trial of the alternative methods under standard conditions, and with a measurement of the results obtained by them. The writer would repeat, then, the suggestion made at the beginning of these articles, that these or other questions be submitted to practical tests and to a measurement of the results of these tests so that some definite check may be made upon the theoretical considerations.